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(71) Applicant(s)
Aethos Communication Systems Limited

(Incorporated in the United Kingdom)

Old Cann School, Salisbury Road, Shaftsbury, Dorset, SP7 0BP, United Kingdom

(72) Inventor(s)
Joseph Martin Sloan

(74) Agent and/or Address for Service
Withers & Rogers
4 Dyer's Buildings, Holborn, LONDON, EC1N 2JT, United Kingdom

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H04M 3/42

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H4K KF42

(56) Documents Cited
GB 2270814 A GB 2156182 A GB 2114398 A
GB 2035754 A EP 0609016 A1 WO 85/02510 A1
US 4876711 A

(58) Field of Search
UK CL (Edition N) H4K KF42 KF54
INT CL[6] H04M

(54) Telecommunications system

(57) A telecommunications system is provided which has the ability to provide special services to subscribers. Such services may include, for example, call screening, call forwarding and call interception. Calls to a subscriber are routed via a service administrator ASC which administers the services. The system may be a cellular one including a gateway mobile switching centre GMSC.

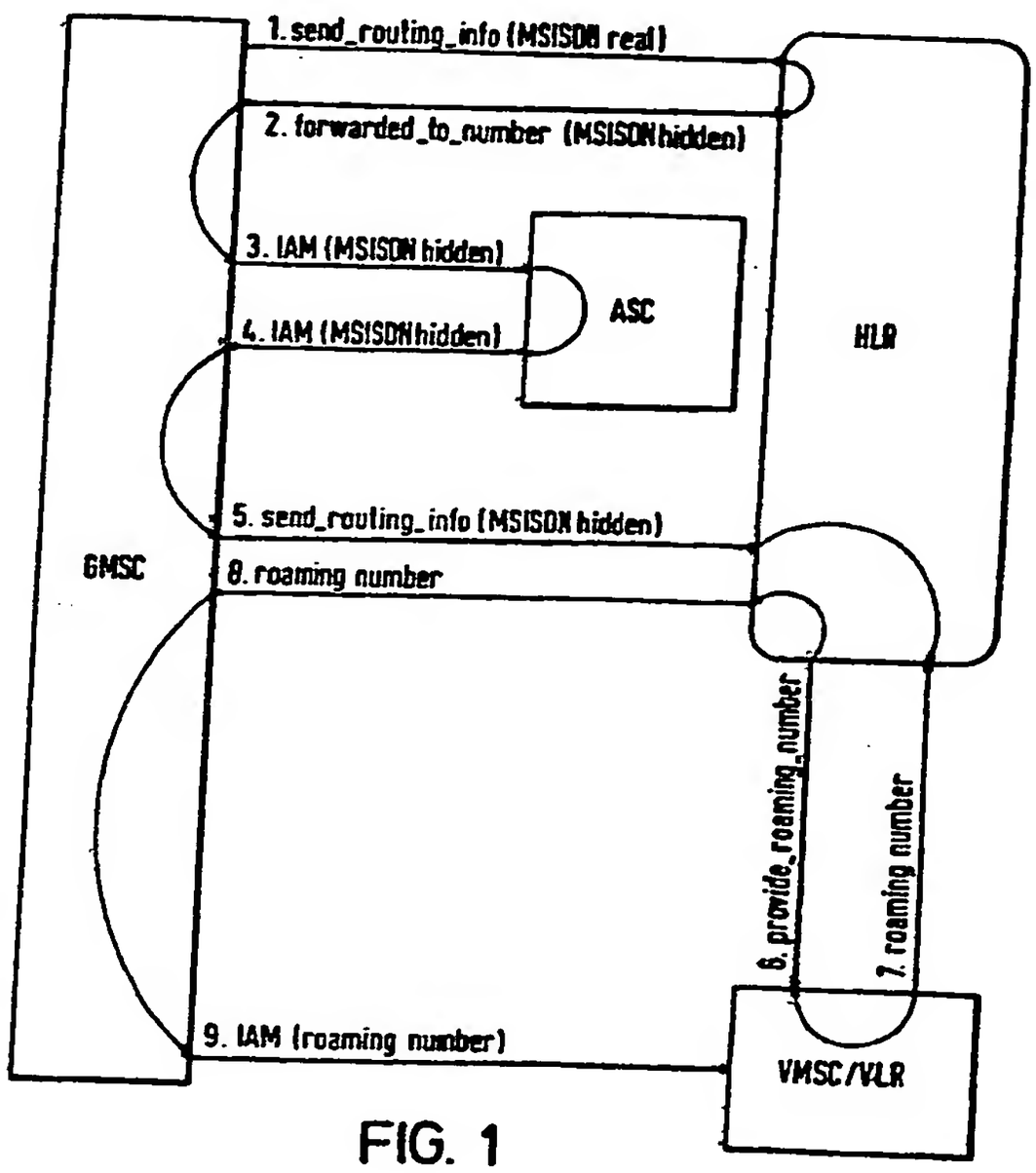

FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995
The print reflects an assignment of the application under the provisions of Section 30 of the Patents Act 1977.

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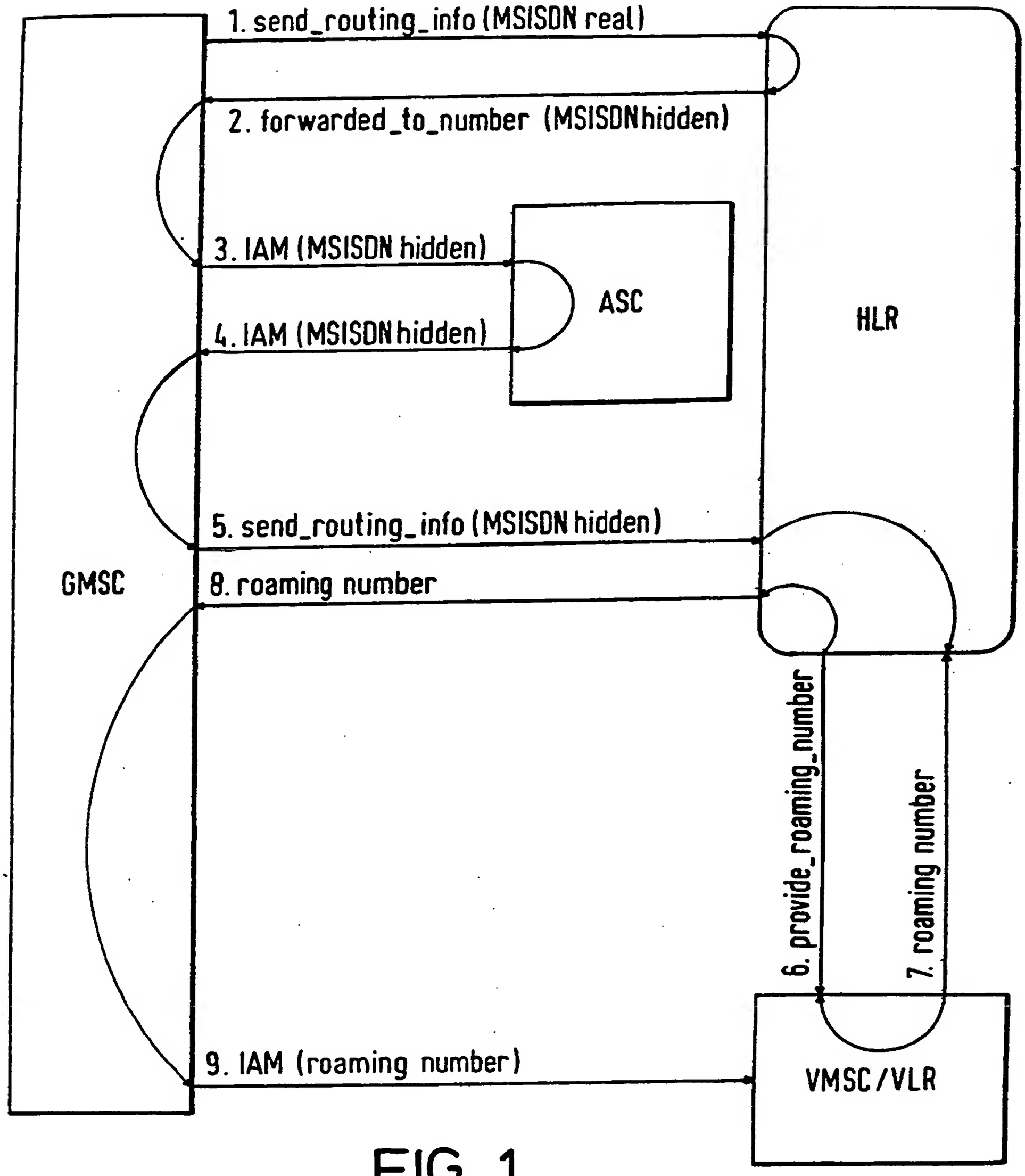

1. send_routing_info (MSISDN real)
2. forwarded_to_number (MSISDNhidden)
3. IAM (MSISDN hidden)
4. IAM (MSISDN hidden)
ASC
HLR
5. send_routing_info (MSISDN hidden)
GMSC
8. roaming number
6. provide_roaming_number
7. roaming number
9. IAM (roaming number)
VMSC/VLR

FIG. 1

FIG. 2a

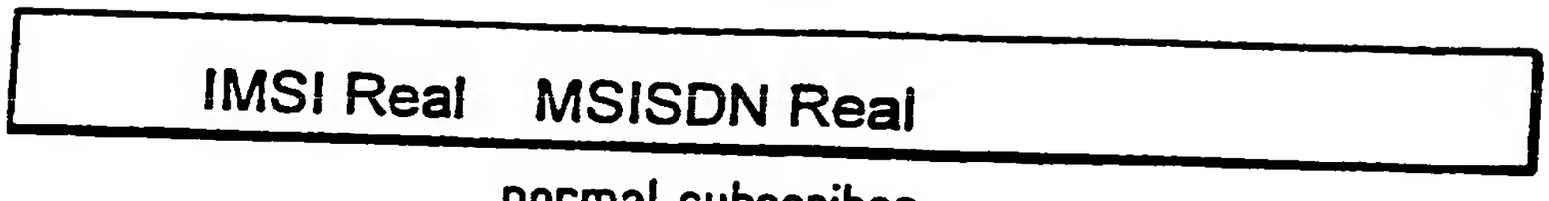
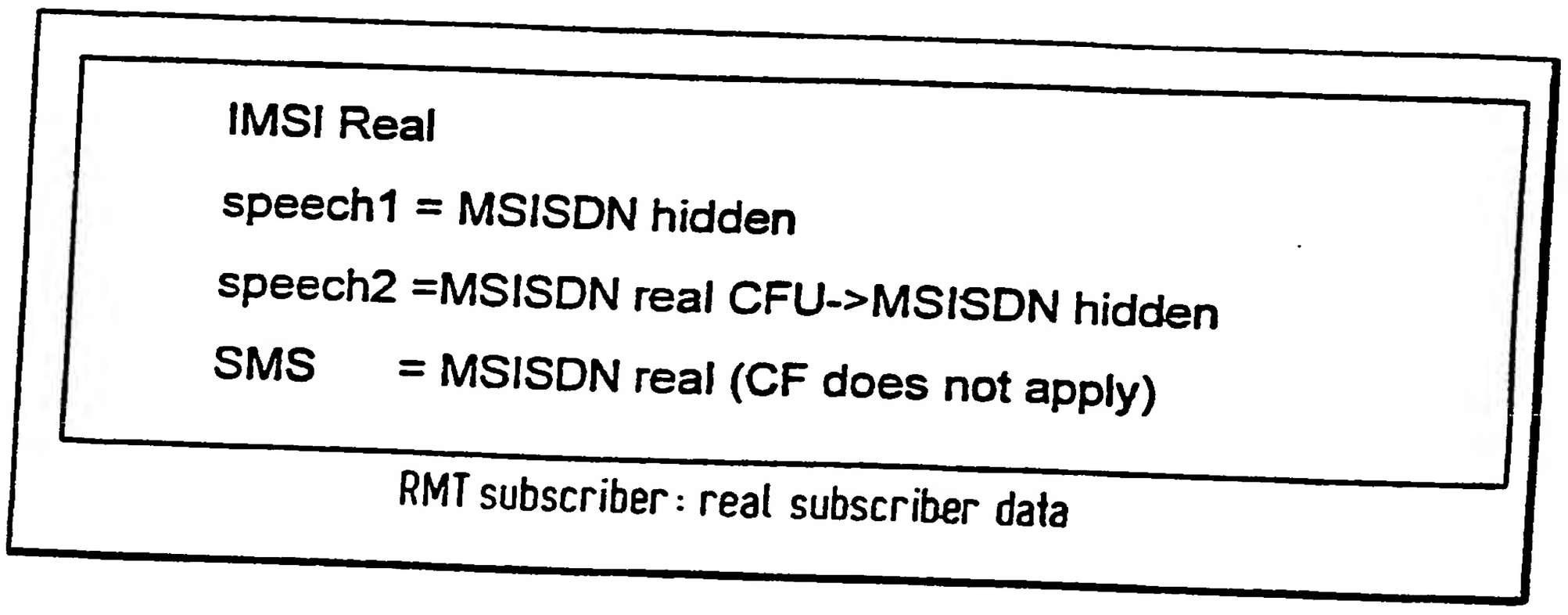


FIG. 2b



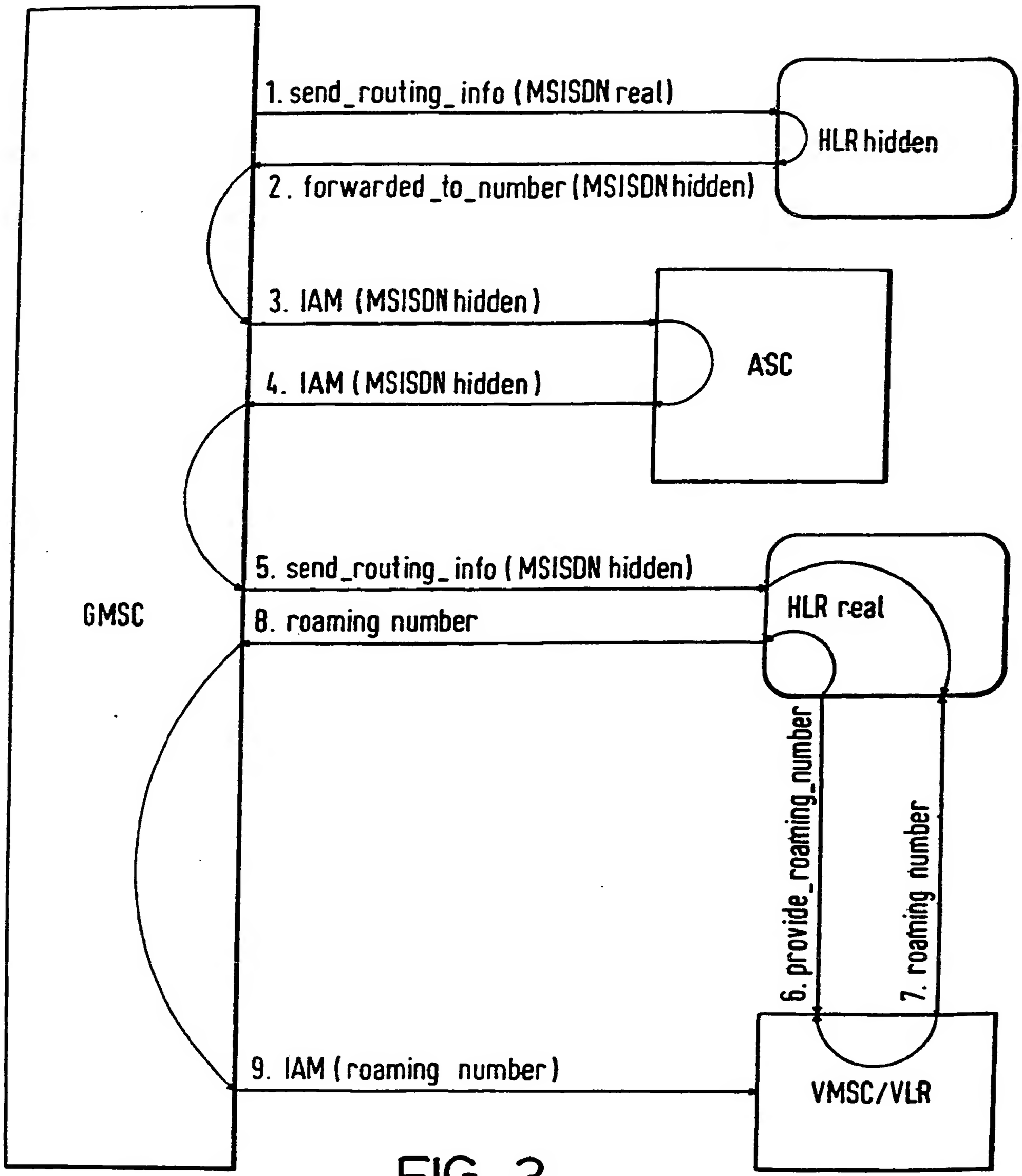

1. send_routing_info (MSISDN real)
HLR hidden
2. forwarded_to_number (MSISDN hidden)
3. IAM (MSISDN hidden)
ASC
4. IAM (MSISDN hidden)
5. send_routing_info (MSISDN hidden)
GMSC
8. roaming number
HLR real
6. provide_roaming_number
7. roaming number
9. IAM (roaming number)
VMSC/VLR

FIG. 3

FIG. 4a

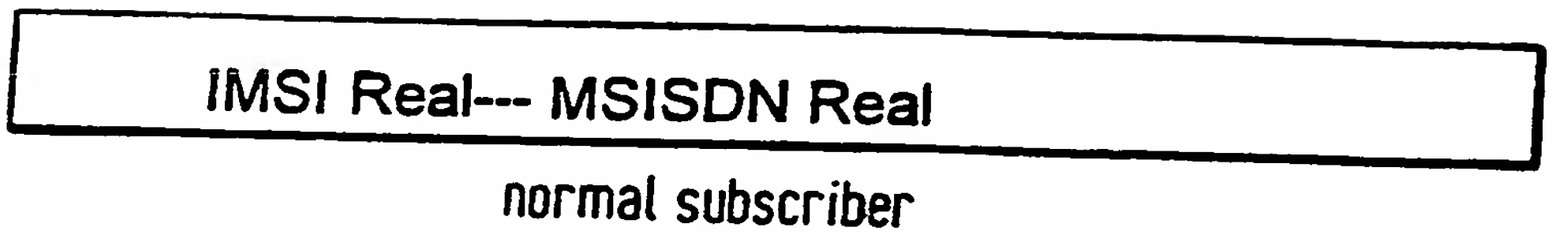


FIG. 4b

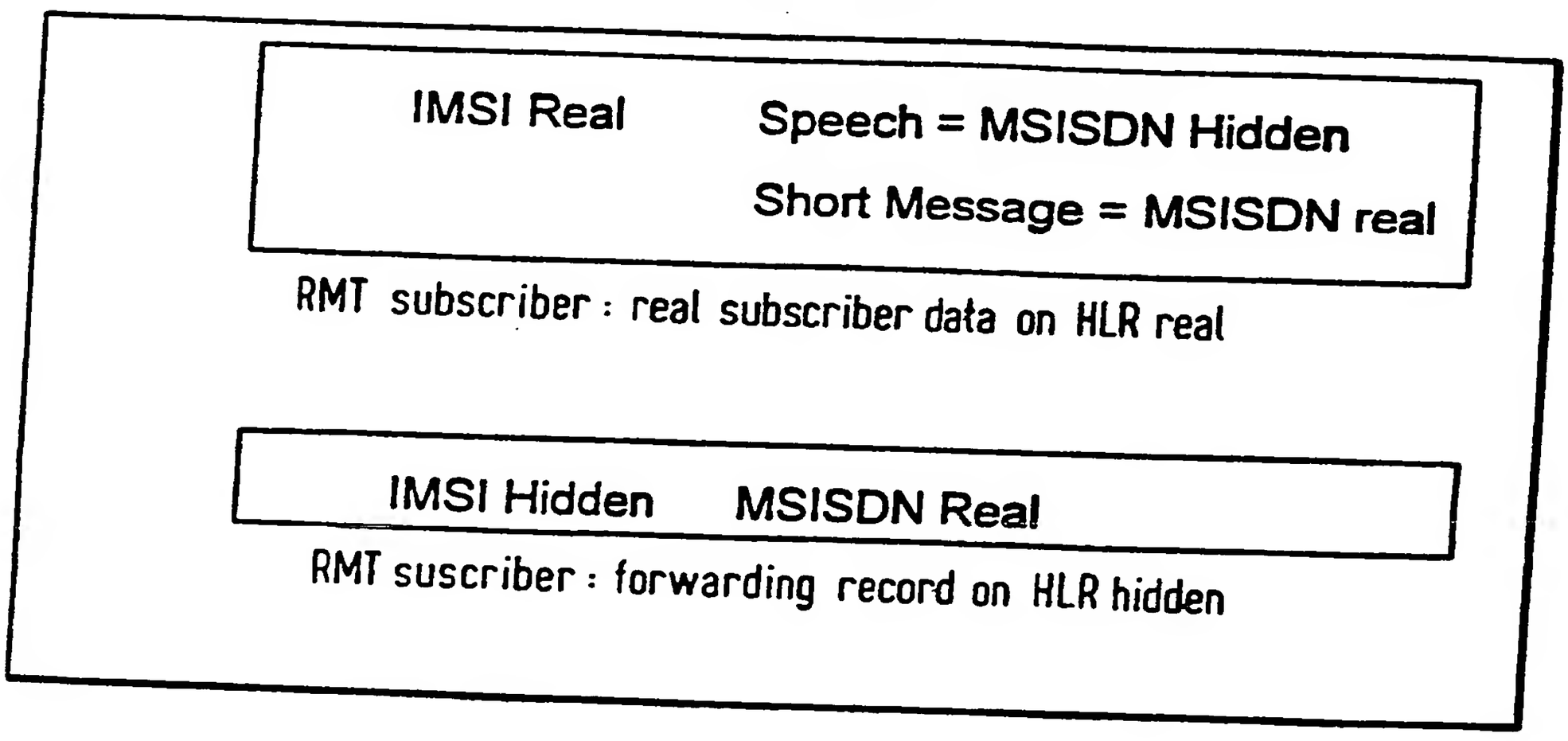
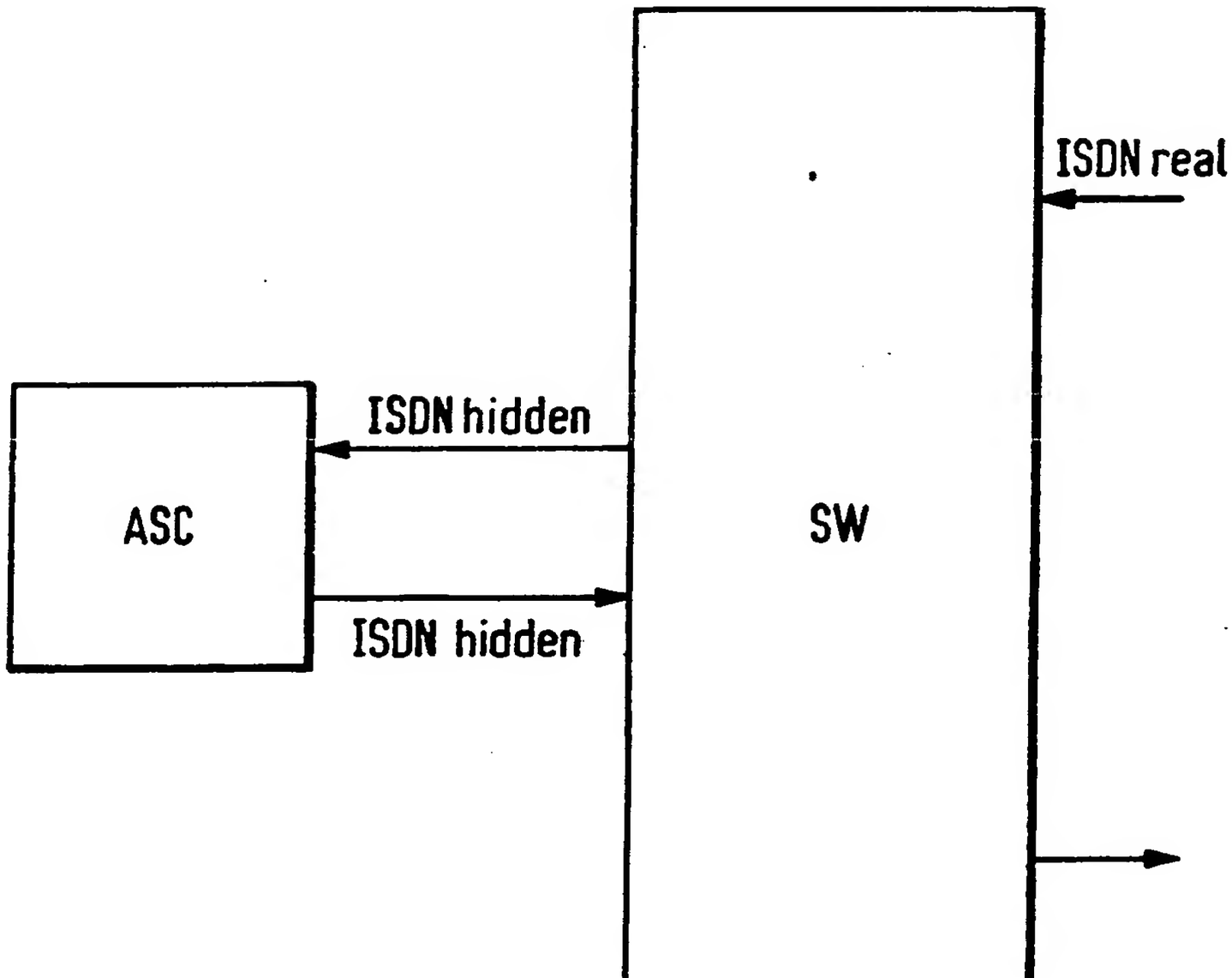


FIG. 5



TELECOMMUNICATIONS SYSTEMS

This invention relates to the allocation of special services to subscribers in telecommunications systems.

For example, current radio telecommunications networks do not have an architecture that readily allows the rapid development and deployment of special services for subscribers such as call screening, call forwarding, and call interception. The GSM standard for mobile telecommunications recognises these problems and has been designed so as to be more like an intelligent network in which service control and switching functions are separated. However, the implementation of GSM is still at an early stage of development as far as special services are concerned.

An object of the present invention is to provide a method and means for allocating special services to subscribers more readily in telecommunications systems such as radio and wire-line systems.

The present invention consists in a method of controlling the allocation of special services to subscribers in a telecommunications system in which individual subscribers are identified by subscriber numbers stored in a register with associated subscriber location information whereby incoming calls can be routed to these subscribers, characterised in that calls

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with subscriber numbers that are to be allocated special services are identified in the register and are forwarded to the subscribers via a service control module in which the special services are administered.

Calls are forwarded to the service control module using a call forwarding service and related subscriber numbers identified in the register that point to the service control module and the called subscriber. The invention can therefore be readily implemented in mobile telephone communications systems such as GSM and wire-line systems that have a call forwarding service.

The actual implementation of the invention will depend upon the topology of the communications system. For example, in one implementation, the subscriber number may be associated with a virtual subscriber in a first data record in the register so that calls are forwarded to a related virtual subscriber who is associated with the real subscriber in a second data record in the same or a separate register. Two subscriber data records are thus required for each subscriber allocated the special services. In an alternative implementation, the normal subscriber data record in the register may be extended so as to create two speech services, one of which serves to forward calls via the services control module to the register using the related subscriber number, and the other of which serves to route calls on to the subscriber using his location information in the normal manner.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of a mobile radio telephone system according to a first embodiment of the invention;

Figures 2a and 2b are schematic diagrams of the subscriber data records used in the home location register of the system of Figure 1;

Figure 3 is a schematic diagram of a mobile radio telephone system according to a second embodiment of the invention;

Figures 4a and 4b are schematic diagrams of the subscriber data records used in the home location register of the system of Figure 3; and

Figure 5 is a schematic diagram of a cable telephone system.

The mobile radio telephone system of Figure 1 includes a gateway mobile switching centre GMSC which is responsible for routing incoming and outgoing traffic and signalling within part of the network to establish calls to and from subscribers' mobile telephones. A home location register HLR contains individual subscriber data records for subscribers allocated to this part of the network as their home network.

A normal subscriber data record associated with a subscriber who has no special services allocated to him is shown in Figure 2a, and comprises his international identity IMSIreal and his

subscriber number MSISDNreal. If the switching centre GMSC receives an incoming call for this subscriber MSISDNreal, it will send an enquiry 1 for routing information to the home location register HLR. If the subscriber at this time is located in another part of the network covered by a visited mobile switching centre VMSC, and is registered in the visitor location register VLR associated with that switching centre, the home location register HLR will hold information of the location of the subscriber IMSIreal in the form of a roaming number supplied in a response 7 following an enquiry 6. This roaming number is therefore supplied to the gateway mobile switching centre GMSC, which then uses it to route the call to the subscriber via the mobile switching centre VMSC.

Alternatively, if a subscriber is allocated special services such as call screening, call forwarding or call interception, the subscriber data record takes the form shown in Figure 2b. Two separate speech services, speech 1 and speech 2, are now associated with the subscriber's identity IMSIreal. Speech 2 has a call forwarding service associated with it which applies to calls with the subscriber number MSISDNreal, and forwards them to a related subscriber number MSISDNhidden which exists in the same subscriber data record as speech 1. Calls are therefore effectively forwarded to the same subscriber IMSIreal, but in being forwarded, they are routed via an auxiliary switching centre ASC which administers the special services identified therein against the subscriber number.

In particular, when the switching centre GMSC receives the routing information MSISDNhidden from the home location register HLR in the response 2, it analyses this information and determines that it is to be sent to the auxiliary switching centre ASC and sets up a call using MSISDNhidden in the call set-up message 3. The auxiliary switching centre ASC then processes the call according to the special services identified for MSISDNhidden (equivalent to MSISDNreal), and then, subject to the results of this processing, continues by setting up a call to the switching centre GMSC using MSISDNhidden in the call set-up message 4. The switching centre GMSC analyses the subscriber number MSISDNhidden, and this time, because the message has originated from the auxiliary switching centre ASC, it sends a routing information enquiry 5 to the home location register HLR using MSISDNhidden. The home location register HLR then sends a response 8 containing the roaming number for the subscriber, and the switching circuit GMSC makes use of this roaming number in a call set-up message 9 to the switching circuit VMSC so as to set up the call to the subscriber.

An alternative mobile radio telephone system is illustrated in Figure 3 in which the same references are used for common components. This system differs from that of Figures 1 and 2 in the form of the subscriber data records used in the home location register to allocate special services to a subscriber. The normal subscriber record shown in Figure 4a is the same as before, but there are now two separate subscriber data records for allocating special services, as shown in Figure 4b. One

record is associated with a virtual or hidden subscriber IMSIhidden and comprises the subscriber number MSISDNreal with a call forwarding service so that calls on this number are forwarded via the auxiliary switching circuit ASC to the related virtual or hidden subscriber number MSISDNhidden which is associated with the real subscriber IMSIreal in the second data record. Calls for the subscriber number MSISDNreal are therefore forwarded using the related subscriber number MSISDNhidden and follow the same route as described in relation to Figure 1, including the auxiliary switching circuit ASC which processes the calls according to the special services identified therein for MSISDNhidden.

As shown in Figure 3, the home location register is divided into a home location register HLRhidden which holds the data records for the virtual or hidden subscriber identities IMSIhidden, and a home location register HLRreal which holds the data records for the real subscriber identities IMSRIreal. However, in alternative embodiments of the invention these records may all be stored in the same home location register.

If the illustrated systems incorporate a short message service, such as proposed for GSM systems, then additional arrangements are necessary to route these to the subscriber. In the system of Figure 1, the subscriber data record is further extended to include a third service SMS for short messages. The gateway mobile switching circuit GMSC analyses the incoming calls to identify short messages, which are classified as calls for the

subscriber number MSISDNreal which lack the call forwarding service. The switching circuit GMSC then enquires with the home location register HLR for routing information to route these short messages to the subscriber. In the system of Figure 3, the subscriber data record for IMSIreal is extended to include a short message service using the subscriber number MSISDNreal. The gateway mobile switching circuit GMSC identifies short messages as in the system of Figure 1, and enquires with the home location register HLRreal for appropriate routing information.

The telecommunications system illustrated in Figure 5 is a cable telephone system including a switch SW through which incoming calls are routed to subscribers, according to their subscriber numbers ISDNreal. If a subscriber number is allocated special services, then this number ISDNreal is translated into a related subscriber number ISDNhidden in the switch SW, which causes the incoming calls for ISDNreal to be routed to an auxiliary switching circuit ASC which administers the special services. Subject to the results of the special services on incoming calls at the auxiliary switching circuit ASC, these calls are routed on via the switch SW to the subscriber using the subscriber number ISDNhidden. The system is therefore similar to that of Figures 1 to 4 in that it uses a related subscriber number ISDNhidden and an auxiliary switching circuit ASC to allocate special services to a subscriber number ISDNreal, but the switch SW finally routes calls directly to the subscriber without the need for visitor location or roaming information.

CLAIMS

1. A method of controlling the allocation of special services to subscribers in a telecommunications system in which individual subscribers are identified by subscriber numbers stored in a register with associated subscriber location information whereby incoming calls can be routed to these subscribers, characterised in that calls with subscriber numbers that are to be allocated special services are identified in the register and are forwarded to the subscribers via a service control module in which the special services are administered.

2. A method as claimed in claim 1, characterised in that calls are forwarded to the service control module using a call forwarding service and related subscriber numbers identified in the register that point to the service control module and the called subscriber.

3. A method as claimed in claim 1 or 2, characterised in that the subscriber number is associated with a first data record in the register so that calls are forwarded to a related virtual subscriber which is associated with the real subscriber in a second data record.

4. A method as claimed in claim 3, characterised in that the related virtual subscriber is implemented by the service control module which processes the calls according to the special services identified therein for the virtual user.

5. A method as claimed in claim 1 or claim 2, characterised in that the register contains a data record which relates to at least first and second services, in which the first service is arranged to direct calls directly to the real subscriber and the second service is arranged to direct calls to the service control module.

6. A method as claimed in claim 5, characterised in that the second service responds to a call made to the subscriber's number and forwards calls to a related subscriber number which corresponds to the virtual subscriber implemented within the service control module.

7. A method as claimed in claim 6, characterised in that calls are forwarded from the service control module to the first service after the special service has been provided by the service control module.

8. A method as claimed in any one of the preceding claims, characterised in that the special service comprises at least one of call screening, call forwarding and call interception.

9. A telecommunications system characterised by a service controller for controlling the allocation of special services to subscribers, wherein individual subscribers are identified by subscriber numbers stored in a register with associated subscriber location information, such that calls to subscriber numbers that are to be allocated special services are identified

in the register and are forwarded to the subscribers via the service controller which administers the special services.

10. A telecommunications system as claimed in claim 9, characterised in that the telecommunications system is a cellular mobile telephone system.

11. A telecommunications system as claim in claim 9, characterised in that the telecommunications system comprises a cable-based communications system.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 -11-
(The Search report)

Application number
GB 9412474.0

Relevant Technical Fields

(i) UK Cl (Ed.N) H4K: KF42; KF54

(ii) Int Cl (Ed.6) H04M

Search Examiner
AL STRAYTON

Date of completion of Search
4 SEPTEMBER 1995

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
ALL

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2270814 A	(NORTHERN) page 12, paragraph 4	1, 8, 9, 11
X	GB 2156182 A	(STC) page 1, lines 64 to 68	1, 8, 9, 11
X	GB 2114398 A	(BT) page 1, lines 101 to 120	1, 8, 9, 11
X	GB 2035754 A	(POST OFFICE) page 1, lines 101 to 112	1, 8, 9, 11
X	EP 0609016 A1	(ATT) see Abstract	1, 8, 9, 11
X	WO 85/02510 A1	(ATT) page 7, lines 29 to 34	1, 8, 9, 11
X	US 4876711	(CURTIN) see Abstract	1, 8, 9, 11

atabases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal 'atents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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